

# NEW OR LITTLE-KNOWN TIPULIDÆ FROM EASTERN ASIA (DIPTERA), LX

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## FIVE PLATES

At this time I am continuing the study of Indian crane flies that were taken by Dr. Fernand Schmid as discussed in various earlier reports in this same series. At this time two genera in the tribe Limoniini are discussed, *Limonia* Meigen and *Helius* Lepeletier and Serville, each being well represented in the Oriental fauna.

### Genus LIMONIA Meigen

*Limonia* MEIGEN, Syst. Besch. Zweifl. Ins. 1 (1818) 116.

LIMONIA (LIMONIA) AMBLYMERA sp. nov.

Plate 1, figs. 1, 14.

Size medium (wing of male about 6 millimeters); mesonotal præscutum obscure yellow with a broad central brown stripe, posterior sclerites of notum chiefly dark brown; pleura yellowed ventrally, with a broad dark brown longitudinal stripe that includes the fore coxæ; legs medium brown; wings strongly infuscated, Sc<sub>1</sub> ending about opposite midlength of Rs, Sc<sub>2</sub> near its tip; abdominal tergites dark brown, intermediate sternites bicolored; male hypopygium with dististyle simple, the rostral prolongation long and slender; gonapophysis with mesal-apical lobe darkened, expanded outwardly, its apex obliquely obtuse.

*Male*.—Length, about 5 to 5.5 millimeters; wing, 5.6 to 6.4; antenna, about 1.3 to 1.5.

Rostrum dark brown, labial palpi yellowed, maxillary palpi black. Antennæ with scape and pedicel black, flagellum brown; basal flagellar segments oval with very short apical pedicels, verticils subequal to the segments; outer segments longer, including the terminal one. Head brownish gray; anterior vertex reduced to a capillary strip.

Pronotum brownish black. Mesonotal præscutum obscure yellow with a broad central brown stripe that widens behind, crossing the suture to include the scutal lobes, the median region narrowly yellow; scutellum and mediotergite brown, pleurotergite yellowed above, ventral half dark brown. Pleura yellow below, dorsally with a broad dark brown longitudinal stripe. Halteres dark brown, base of stem restrictedly paler.

Legs with fore coxæ dark brown, remaining coxæ and all trochanters yellowed, remainder of legs medium brown; claws long, with a major spine before midlength and a small appressed point at near two-thirds the length. Wings (Plate I, fig. 1) strongly infuscated, stigma short-oval, darker brown; veins brown. Venation:  $Sc_1$  ending about opposite midlength of  $R_s$ ,  $Sc_2$  near its tip; cell 1st  $M_2$  short;  $M_{3+4}$  and  $M_4$  subequal; m-cu at or before the fork of  $M$ .

Abdominal tergites dark brown; proximal sternites light yellow, outer segments bicolored, yellow basally, the margins darkened, subterminal segments more uniformly darkened, hypopygium obscure yellow, styli darker. Male hypopygium (Plate 1, fig. 14) with the tergite,  $t$ , large, its posterior border strongly convex, cephalic margin subtruncate with the restricted median area produced. Basistyle,  $b$ , about four times as extensive as the dististyle, the ventromesal lobe large, simple. Dististyle,  $d$ , oval, the rostral prolongation long and slender, gently curved to the subacute tip. Gonapophysis,  $g$ , brown, mesal-apical lobe expanded outwardly, the large apex oblique, obtuse.  $\mathcal{A}$ edeagus,  $a$ , stout, terminating in two oval lobes.

*Habitat*.—Assam.

Holotype, male, Dympep, United Khasi and Jaintia Hills, 6,000 feet, October 1, 1960 (*Schmid*). Paratopotype, 1 male, pinned with type.

*Limonia* (*Limonia*) *amblycera* bears a general resemblance to several other Asiatic members of the subgenus, differing especially in the hypopygial characters. The single most similar species is (*L.*) *machidai* (Alexander), with a vast distribution in Eurasia, especially throughout Japan and eastern China. The two species are most readily separated by the distinctive structure of the gonapophyses.

**LIMONIA (LIMONIA) MACROSTIGMA** (Schummel).

*Limnobia macrostigma* SCHUMMEL, Beitr. Zur Entomol. (1829) 108 pl. 1, fig. 5.

*Limonia* (*Limonia*) *macrostigma* EDWARDS, Trans. Soc. Brit. Ent. 5 (1938) 28.

Widespread in Europe. The present record provides a noteworthy extension of range to the southeast.

Two males, Burawai, Northwest Frontier Province, Pakistan, 10,000 feet, July 7, 1953 (*Schmid*).

**LIMONIA (LIMONIA) MURCIDA** sp. nov.

Plate 1, figs. 2, 15.

General coloration of thoracic dorsum brownish yellow, conspicuously patterned with dark brown, including a central

præscutal area; eyes of male contiguous above; wings faintly yellowed, stigma oval, brown, Sc long, Sc<sub>1</sub> ending about opposite one-fifth Rs; abdominal segments conspicuously bicolored, brownish black, the bases obscure yellow; male hypopygium with tergite transversely suboval; basistyle large, its ventromesal lobe extended into a cylindrical point; dististyle small, short-oval, the rostral prolongation a long curved flattened sickle.

*Male*.—Length, about 7.5 to 8 millimeters; wing, 7.5 to 8.5.

Rostrum and palpi black. Antennæ black throughout; outer flagellar segments elongate, exceeding their verticils. Head dark gray; anterior vertex obliterated, posterior vertex with long coarse setæ.

Pronotum obscure yellow, narrowly darkened laterally. Mesonotum obscure brownish yellow, præscutum with a central dark brown stripe, each scutal lobe with a single darkened area; scutellum similarly dark brown, parascutella and postnotum yellowed. Pleura yellowed ventrally, dorsally with a conspicuous brown longitudinal stripe. Halteres obscure yellow, base of knob slightly more darkened. Legs with fore coxæ dark brown, remaining coxæ and all trochanters yellowed; femora light brown, tips narrowly and vaguely yellowed, remainder of legs light brown. Wings (Plate 1, fig. 2) relatively narrow, faintly yellowed, the base and costal region more evidently so; stigma oval, brown; veins light brown. Venation: Sc long, Sc<sub>1</sub> ending about opposite four-fifths Rs, Sc<sub>2</sub> near its tip, subequal or with Sc<sub>1</sub> a little longer; cell 1st M<sub>2</sub> long, subequal to vein M<sub>4</sub>; m-cu at or close to fork of M; anal veins gently convergent near bases.

Intermediate abdominal tergites conspicuously bicolored, bases obscure yellow, nearly the outer half brownish black, bases and subterminal segments more extensively darkened; sternites with central part extensively light yellow, lateral and posterior borders darkened, outer segments more uniformly brownish black; hypopygium obscure yellow. Male hypopygium (Plate 1, fig. 15) with the tergite, *t*, relatively small as compared with the sternite, transversely suboval, the lateral ends short-pointed, both the posterior and cephalic borders gently convex. Basistyle, *b*, very large with its ventromesal lobe fully five times the area of the dististyle; ventromesal lobe narrowed outwardly, at apex produced into a subcylindrical fingerlike extension, base of lobe with a concentration of long yellow

setæ. Dististyle, *d*, small, short-oval, the rostral prolongation a long curved flattened sickle, narrowed gradually to the subacute tip. Gonapophysis, *g*, with mesal apical lobe slender, curved very gently to the narrowly obtuse tip. Aedeagus terminating in two short divergent lobes.

*Habitat*.—Thailand.

Holotype, male, San Pa Koi, Chiangmai, December 19, 1952 (*D. C. Thurman*). Paratopotypes, 2 males, pinned with type.

*Limonia* (*Limonia*) *murcida* superficially resembles species of the subgenus *Atypophthalmus* Brunetti but from the hypopygial structure is a member of the typical subgenus being best distinguished from other regional species by the structure of the head and male hypopygium.

LIMONIA (LIMONIA) SANNIONIS sp. nov.

Plate 1, figs. 3, 16.

Thoracic dorsum very conspicuously patterned, the mesonotal præscutum and scutum bright yellow, laterally with three large circular black spots; pleura yellow with two longitudinal blackened stripes; knob of halteres blackened; femora yellow with two blackened rings, the outer one terminal; wings pale yellow with an extensive pale brown tessellated pattern, *Sc*<sub>2</sub> long, m-cu before fork of *M*; abdominal tergites dark brown, the posterior borders yellowed; male hypopygium with the rostral spines placed far basad on the outer face of style.

*Male*.—Length, about 6.5 millimeters; wing, 7.

Rostrum and palpi black. Antennæ relatively long, black; flagellar segments subcylindrical, exceeding in length the verticils, surface with a dense white pubescence. Head brown.

Pronotum yellow, the anterior end and lateral borders narrowly darkened. Mesonotal præscutum bright yellow, each side with two conspicuous circular black spots, the intervening sublateral region faintly dusky, anterior and posterior ends of central region paler brown; scutal lobes similarly bright yellow, each with a comparable intensely black spot, the median region behind with a much larger black area; scutellum brownish black, parascutella obscure yellow; mediotergite brownish black, pleurotergite yellow below, with a dorsal brown area. Pleura yellow, with two longitudinal blackened stripes, the more dorsal one narrower, extending from behind the fore coxæ over the ventral anepisternum to the pleurotergite; ventral stripe broader, including the ventral sternopleurite, base of mid-coxæ, and the metapleura, the first

paler and more pruinose. Halteres with stem pale yellow, knob blackened. Legs with coxæ light yellow, mid-pair patterned as described above; trochanters yellow; femora yellow, the tip and a subequal subterminal ring black, subequal in extent to the intervening yellow area; tibiæ yellow, tips very narrowly brownish black; basitarsi chiefly obscure yellow, its outer end and remaining segments brownish black. Wings (Plate 1, fig. 3) with the ground very pale yellow, more brightened in the prearcular and costal fields; an extensive pale brown tessellated pattern that is slightly more extensive than the ground, with larger and darker areas at one-third and at tip of Sc that reach costa, and others at arculus and origin of Rs that do not attain the costa; stigma oval, brown; remaining dark pattern appearing as more or less broken bands in all cells, beyond the cord the pale ground more extensive than in the basal cells; cubital and anal cells with whitened marginal spots, the last in the axilla; prearcular cells light yellow; veins brown, yellowed in the prearcular and costal interspaces. Venation: Sc long, Sc<sub>2</sub> much longer than Sc<sub>1</sub>, ending about opposite the fork of Rs; R<sub>1+2</sub> nearly twice R<sub>2</sub>; cell 1st M<sub>2</sub> subequal in length to distal section of vein M<sub>3</sub>; m-cu about one-third to one-half its length before the fork of M; vein 2nd A short and straight.

Abdominal tergites dark brown, their posterior borders narrowly yellowed, including most of the first segment; basal sternites more extensively yellowed, their bases narrowly darkened; hypopygium yellow. Male hypopygium (Plate 1, fig. 16) with the tergite, *t*, large, transverse, suboval, posterior border very gently emarginate. Basistyle, *b*, with ventromesal lobe closely appressed to body of style. Dististyle, *d*, about two-thirds the size of the basistyle, narrowed outwardly, terminating in an acute darkened point, before this with a single yellow seta of unusual length arising from a circular pale area, the surrounding bristles short and dark; three pale spines on outer margin before midlength, arranged in a compact group. Gonapophysis, *g*, with mesal-apical lobe darkened, narrowed gradually to an acute point. Ædeagus broad, terminating in two small points that include the closely approximated genital tubes.

*Habitat*.—Thailand.

Holotype, male, Doi Chom Cheng, Miss Lemmon's Cabin, 3,000 feet, February 15, 1953 (*D. C. Thurman*).

The peculiar structure of the dististyle of the present fly is much as in the otherwise very different *Limonia* (*Limonia*) *flavoterminalis* Alexander, of Formosa, especially in the position of the rostral spines which are placed on the body of the style far before the prolongation. Both species have the venation and pattern of the wings much the same but all other colorational details are different. The various positions found in the rostral spines in different species of *Limonia* has been discussed in an earlier paper by the writer [Philip. Jour. Sci. 55 (1934) 38-39]. The physical conditions found in the vicinity of the type locality, Miss Lemmon's cabin, near Chiang-mai, in northwestern Thailand have been discussed elsewhere [Ann. Mag. Nat. Hist. (12) 7 (1954) 593].

**LIMONIA (DICRANOMYIA) FRONTALIS (Staeger).**

*Glochina frontalis* STAEGER in Krojer, Naturhist. Tidsskr. 3 (1840) 52.

*Dicranomyia ostensakeni* WESTHOFF, Entom. Nachricht. 10 (1884) 263.

*Dicranomyia immodestoides* ALEXANDER, Ann. Ent. Soc. Amer. 12 (1919) 327-328.

*Dicranomyia iowensis* ROGERS, Florida Ent. 9 (1926) 49-52.

The type of *immodestoides* was from Tokyo, Japan; of *iowensis* from Poweshiek County, Iowa, U.S.A. The species now is known to be widely distributed throughout the Holarctic region and in the northern oriental.

Assam Shergaon, Kameng, Northeast Frontier Agency, 6,600 feet, March 20, 1961 (*Schmid*).

Pakistan—Shigar, Northwest Frontier Province, 7,640 feet, October 1, 1953 (*Schmid*).

**LIMONIA (DICRANOMYIA) PULCHRIENNIS (Brunetti).**

*Dicranomyia pulchripennis* BRUNETTI, Fauna Brit. India, Dipt. Nematocera (1912) 376-377, pl. 7, fig. 8 (wing), pl. 11, fig. 2 (♂ hyp.).

*Limonia* (*Dicranomyia*) *pulchripennis* ALEXANDER, Rec. Indian Mus. 59 (1963) 26.

This unusually attractive fly now is known to be common and widely distributed throughout the lower Himalayas and adjoining ranges. The various expeditions made by Dr. Schmid have added greatly to our knowledge of the species. The name *pulchripennis* is retained but it should be noted that there is an earlier *Limnobia pulchripennis* Loew, 1856, the generic names *Limonia* and *Limnobia* being synonymous.

Pakistan—Balakot, Northwest Frontier Province, 3,226 feet, October 12, 1953 (*Schmid*). Murree, 7,242 feet, June 8–10, 1953 (*Schmid*). Reshun, Chitral, along torrents, 6,400 feet, October 2, 1954 (*Schmid*). Skardu, 7,550 feet, October 13, 1953 (*Schmid*).

Kashmir—Nomal, 5,390 feet, June 11, 1954 (*Schmid*).

Kumaon—Bhowali, 5,700 feet, October 1909 (*A. D. Imms*); Indian Museum (type material); Mussoori, June 18, August 17, 1905 (*Brunetti*); Indian Museum (type material); Simla, October 1908.

North Bengal, Darjiling District—Darjiling (Darjeeling), August 5–10, 1909 (*Paiva*); May 26–27, 1910 (*Brunetti*); September 4, 1909 (*Annandale*); type material; Kurseong, 5,455 feet, September 6, 1958 (*A. Camilleri*).

Sikkim—Bop, 5,950 feet, July 15, 1959; Dethang, 4,000 feet, April 1, 1959; Lachung, 8,610 feet, July 3, 1959; Namnasa, 9,500 feet, July 13, 1959; Padamchen, 7,060 feet, August 29, 1959 (all *Schmid*).

Assam—Cherrapunji, 4,500 feet, October 14, 1960; Khanggoi, 4,828 feet, July 16, 1960; Khaorang, 3,750 feet, August 28, 1960; Nongrim, 3,800 feet, October 11, 1960; Pynursla, 3,750 feet, November 30, 1959; Umsawmat, Khasi-Jaintia, 4,500 feet, October 5, 1960; Chug, Kameng, Northeast Frontier Agency, 7,300 feet, April 15–17, 1961 (all *Schmid*).

*LIMONIA (DICRANOMYIA) NEANANTA* sp. nov. Plate 1, fig. 4; Plate 2, fig. 17.

Allied to *ananta*; general coloration gray, præscutum darker brown medially; antennæ black throughout; halteres with knob brownish black; wings subhyaline, base more yellowed, stigma scarcely indicated; male hypopygium very complex in structure, including outgrowths on basistyle and ventral dististyle; ventral dististyle elongate, pale, the outer fourth darkened.

*Male*.—Length, about 7 to 7.5 millimeters; wing, 6 to 7; antenna, about 1.2 to 1.4.

Rostrum light gray; palpi dark brown. Antennæ black throughout; flagellar segments oval, the outer ones longer, verticils shorter than the segments. Head brownish gray, anterior vertex light gray, more than three times the diameter of scape.

Pronotum dark brown, gray pruinose. Mesonotal præscutum yellowish gray on sides, darker brown medially; scutal lobes brownish gray, the central area, scutellum and postnotum more yellowed, silvery pruinose. Pleura light gray. Halteres with stem light brown, more yellowed basally, knob brownish black.



Legs with fore coxæ dark brown, remaining coxæ and all trochanters obscure yellow; remainder of legs brown, femoral bases more yellowed, outer segments darker; claws long and slender, at base with one long and about two smaller spines. Wings (Plate 1, fig. 4) subhyaline, base more yellowed, stigma scarcely differentiated; veins brown, more yellowed in the prearcular field. Venation: Sc short, Sc<sub>1</sub> ending about opposite origin of Rs, Sc<sub>2</sub> retracted, Sc<sub>1</sub> alone about one-third Rs; m-cu longer than distal section of Cu<sub>1</sub>, variable in position, at or some distance before the fork of M (in type); cell 2nd A long and narrow.

Abdomen elongate; tergites dark brown, sparsely pruinose, basal sternites obscure yellow, outer segments and hypopygium dark brown, the major lobe of ventral dististyle light yellow, its tip dusky. Male hypopygium (Plate 2, fig. 17) large and complex in structure; tergite, *t*, cordiform, the cephalic portion rounded, the posterior angles rounded and darkened, with long setæ. Basistyle, *b*, large and complex, its ventromesal lobe very long, flattened outwardly, before midlength with a strong lateral arm, at near two-thirds its length with a comb of modified flattened yellow setæ; mesal face of basistyle near apex with a relatively short lobe that is margined with stiff black setæ. Outer dististyle, *d*, a slender curved yellow sickle; ventral style subequal in area to the entire basistyle, at base with a powerful yellow rod, its apex a subglobular darkened head; body of style elongate, pale, the outer fourth dusky; rostral prolongation with two spines, the apex obliquely obtuse. Gonapophysis with mesal-apical lobe gently curved.

*Habitat*.—Kashmir, Pakistan.

Holotype, male, Minimarg, Kashmir, 9,993 feet, September 8, 1953 (*Schmid*). Paratopotypes, 5 males, September 8–10, 1953. Paratypes, 1 male, Besal, Northwest Frontier Province, Pakistan, 10,715 feet, July 8, 1953; 3 males, Lal Pani, Northwest Frontier Province, 12,000 feet, September 3–5, 1953 (*Schmid*).

The nearest regional ally of the present fly is *Limonia* (*Dicranomyia*) *ananta* Alexander, from high altitudes in Kashmir. The two species differ conspicuously in hypopygial structure. The most similar Holarctic species are *L. (D.) complicata* (de Meijere) of the western Palaearctic and various Nearctic species as *L. (D.) intricata* Alexander. A list of the Holarctic species of the subgenus that have the male hypopygium com-



plex in structure has been provided in an earlier report [Philip. Jour. Sci, 93 (1964) 287].

*LIMONIA (DICRANOMYIA) RECTISTYLA* sp. nov.

Plate 1, fig 5; Plate 2, fig. 18.

General coloration of the thorax orange; front and rostrum yellow, the reduced palpi black; antennæ black, flagellar segments with short apical pedicels; anterior vertex broad, silvery; legs light brown; wings rather strongly infuscated, stigma darker, vein Sc long, ending about opposite two-thirds Rs; male hypopygium with posterior border of tergite nearly truncate, without lateral lobes; basistyle with ventromesal lobe slender, simple; dorsal dististyle a nearly straight slender rod, its tip obtuse; rostral spines two, slightly unequal; apex of gonapophysis narrowed and recurved.

*Male*.—Length, about 5.5 millimeters; wing, 6; antenna, about 1.6.

Front and rostrum light yellow; palpi reduced, black. Antennæ with scape and pedicel brown, flagellum black; flagellar segments suboval, with short abrupt apical pedicels; verticils unusually short, the abundant pale setæ still shorter; terminal segment a trifle longer than the penultimate. Head with anterior vertex broad, light silvery, remainder of head dark brown.

Pronotum reduced in size, brownish yellow, with long erect setæ. Mesonotal præscutum and scutum orange, posterior sclerites of notum slightly more infuscated, pleura more yellowed. Halteres brownish black. Legs with coxæ and trochanters yellow; femora light brown, slightly darker at tips; tibiæ and tarsi light brown; claws brown, enlarged and blackened at base, with a concentration of long yellow spines at base and a further appressed one at near midlength. Wings (Plate 1, fig. 5) rather strongly infuscated, the oval stigma still darker; veins brown. Veins beyond general level of origin of Rs with strong macrotrichia. Venation: Sc long, Sc<sub>1</sub> ending about opposite two-thirds Rs, Sc<sub>2</sub> near its tip; free tip of Sc<sub>2</sub> perpendicular, a short distance beyond R<sub>2</sub>; R<sub>1</sub> + <sub>2</sub> jutting beyond this point as a short spur; m-cu at fork of M.

Abdominal tergites brownish black, sternites yellow; hypopygium brownish yellow. Male hypopygium (Plate 2, fig. 18) with the tergite, *t*, transverse posterior border nearly truncate, without lateral lobes, anterior margin gently convex. Basistyle, *b*, with the ventromesal lobe long and slender, simple. Dorsal dististyle, *d*, a nearly straight slender rod, the tips

obtuse; ventral style subequal in area to basistyle; rostral prolongation slender, the two spines before midlength, slightly unequal. Gonapophysis, *g*, with mesal-apical lobe slender, tip narrowed and slightly recurved. *Æ*deagus narrow, genital tubes approximated at midline.

*Habitat*.—Assam.

Holotype, male, Sirhoi Kashong, Manipur, 6,000 feet, June 6, 1960 (*Schmid*).

*Limonia* (*Dicranomyia*) *rectistyla* differs from other small members of the subgenus having vein Sc long and the male antennæ relatively long by the hypopygial structure, particularly the outer dististyle and gonapophysis. The much smaller *L. (D.) gentilis* Alexander, likewise from Assam, may be compared.

LIMONIA (DICRANOMYIA) VARSHA sp. nov. Plate 1, fig. 6; Plate 2, fig. 19.

Allied to *malina*; body yellowed, with strong greenish tints, præscutum with a dark brown central stripe; wings whitened, conspicuously patterned with brown; m-cu variable in position, in cases its own length before fork of M; male hypopygium with tergal setæ marginal; tip of dorsal dististyle strongly recurved; ventral style with rostral spines placed close to apex of the short stout prolongation.

*Male*.—Length, about 7.5 to 8 millimeters; wing, 8.5 to 9.5; antenna, about 1.4 to 1.5.

Rostrum light brown; palpi brownish black. Antennæ of type light brown; flagellar segments oval, terminal segment enlarged, about one-half longer than the penultimate. Head brownish gray.

Cervical region brownish black. Pronotum brownish black above, yellow on sides, in cases with strong greenish tints. Mesonotal præscutum yellow with a broad dark brown central stripe; scutal lobes and sides of scutellum brown, the central area pale; postnotum yellowed, central part of mediotergite darker. Pleura yellow, in some specimens strongly tinged with green. Halteres short, stem obscure yellow, knob infuscated. Legs with coxæ and trochanters yellow to light green; femora brown, the narrow tip and a broad area beyond midlength paler; tibiæ brownish yellow, tip narrowly darker brown; tarsi brown. Wings (Plate 1, fig. 6) whitened, with a conspicuous brown pattern, including cells C and Sc, continued outwardly in outer radial field to wing tip; extensive darker brown clouds at origin of Rs, fork of Rs, continued along vein R<sub>2+3</sub> to the

brown stigma; extensive brown seams over cord, outer end of cell 1st  $M_2$ , along vein Cu and the outer half of M; in the type the darkenings in outer medial field include cell 1st  $M_2$  and extensive seams over the outer veins; veins light yellow or green in the ground, infuscated in the patterned parts. Venation:  $Sc_1$  ending opposite or just beyond origin of Rs,  $Sc_2$  far retracted,  $Sc_1$  alone nearly as long as Rs, the latter angulated and spurred in type; position of m-cu unusually variable, in cases fully its own length before fork of M, in others shortly before the fork.

Abdomen light brown, the tergites darker medially. Male hypopygium (Plate 2, fig. 19) with the tergite, *t*, small, the posterior border with a V-shaped emargination, the obtuse lobes with long marginal setæ. Basistyle, *b*, much smaller than the ventral dististyle, the ventromesal lobe simple. Dorsal dististyle, *d*, strongly arcuated, tip recurved; ventral style with rostral prolongation very short, apex precipitous; spines two, placed close to tip, slightly separated. Gonapophysis, *g*, with mesal-apical lobe long and slender.

*Habitat*.—India (Sikkim).

Holotype, male, Namnasa, 9,500 feet, July 13, 1959 (*Schmid*).

Allotopotype, female, pinned with type. Paratopotype, 1 female, pinned with type. Paratypes, 1 male, Bichu, 8,000 to 8,500 feet, July 14, 1959; 1 male, Chamiteng, 9,900 feet, August 24, 1959 (*Schmid*).

*Limonia* (*Dicranomyia*) *varsha* is closely related to *L. (D.) malina* Alexander, differing especially in the heavy wing pattern and in slight details of the male hypopygium. The series available shows unusual variation in the wing venation but appears to represent a single species.

**LIMONIA (GERANOMYIA) COMMOGASTRA** sp. nov. Plate 1, fig. 7; Plate 2, fig. 21.

Allied to *semistriata*; mesonotal præscutum with sides broadly yellow, disk with a single plumbeous brown area, pleura yellow, darkened dorsally; legs yellowish brown; wings whitened, with a conspicuous brown pattern; abdominal tergites light yellow, posterior borders narrowly brown to produce a conspicuous pattern; male hypopygium with the margin of lobe of gonapophysis microscopically toothed.

*Male*.—Length, excluding rostrum, about 6 millimeters; wing, 5.8; rostrum, about 2.

Rostrum and palpi black, the former relatively short, about twice the antennæ. Antennæ black throughout; flagellar seg-

ments suboval, ends truncated, verticils small; terminal segment narrowed on outer third. Head dark brown.

Pronotum darkened above, sides obscure yellow. Mesonotal præscutum broadly yellow laterally, especially in front, the disk with a single dark plumbeous brown stripe that is vaguely more reddened behind, broad at the suture, narrowed anteriorly, not quite reaching the margin; scutum yellowish gray, each lobe darkened, this being a posterior continuation of the lateral margins of the præscutal area; scutellum light yellow, the disk brown, darkest centrally, more reddened on sides; postnotum dark brown, sparsely pruinose. Pleura yellow ventrally, including also the lower third of pleurotergite, dorsally with a broad brown stripe extending from the cervical region to postnotum. Halteres with stem obscure yellow, knob blackened. Legs with coxæ and trochanters light yellow; remainder of legs pale yellowish brown, only the outer tarsal segments darker. Wings (Plate 1, fig. 7) whitened, with a conspicuous brown pattern chiefly in the costal and radial fields; a series of six larger costal areas, the first narrow at *h*, widened behind; second area at the supernumerary crossvein in cell Sc, widest in cell C, narrowed in cell R, not reaching M; third area at origin of Rs, similar in outline to the second marking; fourth area small, at fork of Sc; stigmal area largest; outer mark, at ends of veins  $R_3$  and  $R_{4+5}$ , enclosing a yellow marginal spot in cell  $R_3$ ; further restricted darkenings appear as an interrupted series over cord and outer end of cell 1st  $M_2$ ; paler brown washes near outer ends of cells  $R_5$  and 2nd  $M_2$ , with a further small seam at end of vein 2nd A; veins yellow in the ground, slightly darker in the patterned parts. Venation: Sc long,  $Sc_1$  ending about opposite four-fifths Rs; m-cu about one-half its length before fork of M.

Abdominal tergites conspicuously patterned, broadly light yellow, the narrower posterior borders brown, more extensive on the basal segment, sternites clear light yellow; hypopygium chiefly darkened. Male hypopygium (Plate 2, fig. 21) with the tergite, *t*, transverse, gently narrowed outwardly, posterior border very shallowly emarginate. Basistyle, *b*, small, only about one-fifth as large as the ventral dististyle, ventromesal lobe oval. Dorsal dististyle, *d*, strongly arcuated, slightly dilated beyond midlength, thence narrowed into a long slender spine; ventral style large and fleshy, rostral prolongation small, the two straight spines placed close together on outer margin,

ments suboval, ends truncated, verticils small; terminal segment narrowed on outer third. Head dark brown.

Pronotum darkened above, sides obscure yellow. Mesonotal præscutum broadly yellow laterally, especially in front, the disk with a single dark plumbeous brown stripe that is vaguely more reddened behind, broad at the suture, narrowed anteriorly, not quite reaching the margin; scutum yellowish gray, each lobe darkened, this being a posterior continuation of the lateral margins of the præscutal area; scutellum light yellow, the disk brown, darkest centrally, more reddened on sides; postnotum dark brown, sparsely pruinose. Pleura yellow ventrally, including also the lower third of pleurotergite, dorsally with a broad brown stripe extending from the cervical region to postnotum. Halteres with stem obscure yellow, knob blackened. Legs with coxæ and trochanters light yellow; remainder of legs pale yellowish brown, only the outer tarsal segments darker. Wings (Plate 1, fig. 7) whitened, with a conspicuous brown pattern chiefly in the costal and radial fields; a series of six larger costal areas, the first narrow at *h*, widened behind; second area at the supernumerary crossvein in cell Sc, widest in cell C, narrowed in cell R, not reaching M; third area at origin of Rs, similar in outline to the second marking; fourth area small, at fork of Sc; stigmal area largest; outer mark, at ends of veins  $R_3$  and  $R_{4+5}$ , enclosing a yellow marginal spot in cell  $R_3$ ; further restricted darkenings appear as an interrupted series over cord and outer end of cell 1st  $M_2$ ; paler brown washes near outer ends of cells  $R_5$  and 2nd  $M_2$ , with a further small seam at end of vein 2nd A; veins yellow in the ground, slightly darker in the patterned parts. Venation: Sc long,  $Sc_1$  ending about opposite four-fifths Rs; m-cu about one-half its length before fork of M.

Abdominal tergites conspicuously patterned, broadly light yellow, the narrower posterior borders brown, more extensive on the basal segment, sternites clear light yellow; hypopygium chiefly darkened. Male hypopygium (Plate 2, fig. 21) with the tergite, *t*, transverse, gently narrowed outwardly, posterior border very shallowly emarginate. Basistyle, *b*, small, only about one-fifth as large as the ventral dististyle, ventromesal lobe oval. Dorsal dististyle, *d*, strongly arcuated, slightly dilated beyond midlength, thence narrowed into a long slender spine; ventral style large and fleshy, rostral prolongation small, the two straight spines placed close together on outer margin,

slightly unequal in length. Gonapophysis, *g*, yellowed, mesal-apical lobe with concave margin microscopically toothed.

*Habitat*.—Assam (Northeast Frontier Agency).

Holotype, male, Bhairabkunda, Kameng, 700 to 1,000 feet, March 8, 1961 (*Schmid*).

The most similar regional species is *Limonia* (*Geranomyia*) *semistriata* (Brunetti) which is readily told by the coloration of the thorax and legs and especially of the abdomen. The wing pattern and details of structure of the male hypopygium similarly are distinctive.

*LIMONIA* (*GERANOMYIA*) *DURGA* sp. nov.

Plate 1, fig. 8; Plate 2, fig. 20.

General coloration of thorax fulvous yellow, the præscutum with a dark brown central stripe and less conspicuous laterals; legs medium brown; wings brownish yellow with a brown pattern that includes seven solidly infuscated costal areas that do not reach vein M behind; *Sc*<sub>1</sub> ending about opposite three-fifths *Rs*; male hypopygium with the dorsal dististyle lacking, ventral style large, its area about four times that of the basistyle; rostral prolongation pale, pendant, outer margin with a single strong curved spine; gonapophysis pale, the margin at near midlength with a strong lateral lobe.

*Male*.—Length, excluding rostrum, about 5.5 millimeters; wing, 6.5; rostrum, about 2.2 to 2.3.

*Female*.—Length, excluding rostrum, about 6 millimeters; wing, 7.

Rostrum black, less than one-half the remainder of body. Antennæ with scape brown, remainder of organ black; flagellar segments oval with short verticils. Head above with a central gray line, sides more blackened.

Pronotum above buffy brown, sides darker. Mesonotal præscutum fulvous yellow with a dark brown central stripe and less conspicuous laterals; scutum yellow, center of lobe with a single large brown area; scutellum yellow, narrowly dark brown medially; mediotergite light gray in front with about the posterior third brown, pleurotergite more yellowed. Pleura yellow below, very slightly more darkened dorsally. Halteres with stem obscure yellow, knob weakly darkened. Legs with coxæ and trochanters yellow; remainder of legs light to medium brown, the femoral bases restrictedly more yellowed. Wings (Plate 1, fig. 8) with the ground brownish yellow, the prearcular and costal fields clearer yellow; a series of seven solidly infuscated costal areas, the first postarcular, third at origin

of Rs, none reaching vein M behind; fourth area at tip of Sc, in cases confluent with the third marking or virtually so; stigmal area large, rectangular; remaining costal marks at tips of veins  $R_3$  and  $R_{4+5}$ ; still other narrow brown seams at cord and outer end of cell 1st  $M_2$  and as small spots at ends of anal veins, larger on 2nd A; veins brownish yellow, clear yellow in the costal interspaces. Venation: Sc long,  $Sc_1$  ending about opposite three-fifths Rs; cell 1st  $M_2$  long, subequal to vein M  $1+2$  beyond it; m-cu variable in position, from about one-third its length before fork of M to shortly beyond the fork.

Abdominal tergites dark brown, sternites brownish yellow. Male hypopygium (Plate 2, fig. 20) with the tergite, *t*, transverse, posterior border emarginate, the low rounded lobes with numerous long setae. Basistyle, *b*, small, its area about one-fourth that of the ventral dististyle, the ventromesal lobe oval, with long setae. Ventral dististyle, *d*, with scattered relatively short setae; rostral prolongation flattened, outer end pendant, outer margin near base with a single strong curved spine; dorsal style lacking. Gonapophysis, *g*, pale, the margin at near midlength with a strong lateral lobe or obtuse spine.

*Habitat*.—Assam (Northeast Frontier Agency).

Holotype, male, Foothills, Kameng, 700 feet, February 7, 1961 (*Schmid*). Allotopotype, female, pinned with type. Paratopotype, male, pinned with type; paratype, 1 male, Amatulla, Kameng, 1,250 to 2,000 feet, March 10, 1961 (*Schmid*).

*Limonia* (*Geranomyia*) *durga* is most similar to species such as *L. (G.) cernua* Alexander and *L. (G.) fortibasis* Alexander, differing especially in the structure of the male hypopygium, especially the dististyle and gonapophysis. The loss of the dorsal dististyle should be emphasized.

**LIMONIA (GERANOMYIA) HIRUDINIS** sp. nov. Plate 1, fig. 9; Plate 2, fig. 22.

Disk of mesonotal præscutum polished black, the sides broadly yellow; legs brownish yellow, outwardly passing into light brown; wings weakly infuscated, the oval stigma still darker,  $Sc_1$  ending about opposite three-fifths Rs; male hypopygium with the spine of the rostral prolongation of ventral dististyle single, from an enlarged base that bears an appressed sclerotized rod or modified spine; gonapophysis with base of mesal-apical lobe very stout.

*Male*.—Length, excluding rostrum, about 5.5 millimeters; wing, 6; rostrum, about 2.5.



Rostrum and palpi dark brown, the former less than one-half the remainder of the body. Antennæ dark brown. Head brown.

Pronotum yellowed. Mesonotal præscutum with sides broadly yellow, the disk with three confluent polished black stripes; scutal lobes similarly blackened, the median area vaguely paler; scutellum brownish black, posterior border obscure yellow; mediotergite brownish black, pleurotergite brownish yellow, clearer yellow ventrally. Pleura chiefly yellowed, mesepisternum weakly darkened. Halteres with stem brown, base yellowed, knob brownish black. Legs with coxæ and trochanters yellow; femora brownish yellow, tibiæ and tarsi light brown. Wings (Plate 1, fig. 9) weakly infuscated, prearcular and costal fields more yellowed; stigma oval, medium brown; veins brown, paler in the brightened fields. Venation:  $Sc_1$  ending about opposite three-fifths  $R_s$ ,  $Sc_2$  near its tip; supernumerary crossvein in cell  $Sc$  distinct;  $m-cu$  shortly before fork of  $M$ .

Abdominal tergites dark chestnut brown, sternites more yellowed; hypopygium (Plate 2, fig. 22) with the tergite,  $t$ , subrectangular in general outline, nearly as long as broad; posterior border with a shallow V-shaped emargination, the low lobes with about 12 or 13 strong setæ on outer apical part. Basistyle,  $b$ , relatively large, its area about one-third that of the ventral dististyle; ventromesal lobe small. Dorsal dististyle,  $d$ , a strong bent rod, more slender at near midlength; ventral style large, oval, rostral prolongation small, the spine very conspicuous, including a stout basal enlargement that is tipped with a somewhat longer gently curved spine; on face of the expanded base with a short stout appressed leechlike spine. Gonapophysis,  $g$ , with base of mesal-apical lobe very stout, gradually narrowed outwardly to a decurved spine, the concave margin microscopically toothed. Apex of ædeagus rounded.

*Habitat*.—Assam (Northeast Frontier Agency).

Holotype, male, Amatulla, Kameng, 1,250 to 2,000 feet, March 10, 1961 (*Schmid*).

*Limonia* (*Geranomyia*) *hirudinis* is entirely different from other regional members of the subgenus that have unpatterned wings except for the stigmal darkening. Such species include *L. (G.) fletcheri* (Edwards) and *L. (G.) ganesa* Alexander, with the wings strongly darkened, together with *L. (G.) gracilispinosa* Alexander and *L. (G.) gravelyana* Alexander, with the wings paler, as in the present fly. The male hypopygium is quite distinct in all of these species.

LIMONIA (EURHIPIDIA) HEXADICLONA sp. nov. Plate 1, fig. 10; Plate 2, figs 23, 24.

General coloration of entire body brownish black; antennæ of male 11-segmented, six long-bipectinate segments, the outer two simple; legs brownish black, tarsal segments two through four of all legs snowy white; wings whitish hyaline, the small subcircular stigma pale brown; male hypopygium with rostral spines long, placed at summit of a conspicuous basal tubercle; mesal-apical lobe of gonapophysis with microscopic tubercles.

*Male*.—Length, about 4 millimeters; wing, 4.1; antenna, about 1.

Rostrum dark brown, about one-half the remainder of head; palpi brown. Antennæ (Plate 2, fig. 24) 11-segmented, brown; flagellar segments two to seven, inclusive, each with long branches, the longest about one-half longer than the segment, slightly enlarged and bulbous on nearly the outer half; first flagellar segment with a single branch that is about equal in length to the segment, the opposite face strongly produced but not forming a branch; outer two segments simple, the last oval, about one-half longer than the penultimate. Head dark brown.

Thoracic dorsum almost uniformly brownish black, the pleura paler brown, sparsely pruinose, ventral sternopleurite darker. Halteres with stem obscure yellow, knob blackened. Legs with fore coxæ brown, the others obscure yellow; trochanters yellow; femora, tibiæ and basitarsi of all legs brownish black, tarsal segments two through four snowy white, terminal segment darkened. Wings (Plate 1, fig. 10) whitish hyaline, the small subcircular stigma pale brown; veins brown, those in prearcular field more yellowed. Venation:  $Sc_1$  ending about opposite origin of  $R_s$ ,  $Sc_1$  longer than  $R_s$ ; cell  $M_2$  open by atrophy of  $m$ ; cell  $M_3$  relatively deep, vein  $M_{3+4}$  shorter than  $M_4$ ;  $m-cu$  at fork of  $M$ .

Abdomen brownish black, basal sternites paler, gray pruinose. Male hypopygium (Plate 2, fig. 23) having posterior border of tergite,  $t$ , with a deep V-shaped notch, lobes broadly rounded, with numerous setæ that are longer toward the midline, the more lateral ones small. Basistyle,  $b$ , subequal in area to the ventral dististyle; ventromesal lobe large, oval, with very long setæ. Dorsal dististyle,  $d$ , a strongly curved sickle, narrowed gradually into a long spine; ventral style with rostral prolongation long, with two long spines from summit of a conspicuous basal tubercle that is about one-half as long as the spines;

apex of prolongation beyond the tubercle very short, with several setæ, the outermost larger. Gonapophysis, *g*, with mesal-apical lobe nearly straight, tip short-pointed, surface of lobe with microscopic tubercles. *Æ*deagus terminating in two pale oval lobes.

*Habitat*.—Assam (Northeast Frontier Agency).

Holotype, male, Ankaling, Kameng, 2,100 feet, March 12, 1961 (*Schmid*).

The other regional members of the subgenus *Eurhipidia* Alexander with unpatterned wings have the antennæ of the male 14-segmented, these including *Limonia* (*Eurhipidia*) *coheriana* Alexander, *L. (E.) simplicis* Alexander and some others. The only other known species having the antennæ 11-segmented is *L. (E.) endecamera* Alexander, of southeast Africa. While generally similar to the present fly, this latter species has the antennal flagellum with seven bipectinate segments, with only the terminal one simple.

**LIMONIA (MELANOLIMONIA) EVEXA** sp. nov.      Plate 1, fig. 11; Plate 2, fig. 25.

Size small (wing of male about 5 millimeters); general coloration of thorax dark brown; wings tinged with brown, stigma slightly darker; male hypopygium with the dorsal dististyle a simple rod; rostral spine of ventral style elongate; *æ*deagus very broad, its tip obtuse, lateral shoulders virtually lacking, the sides microscopically crenulate, without setæ.

*Male*.—Length, about 4.5 millimeters; wing, 5.2; antenna, about 1.0.

Rostrum dark brown; palpi black. Antennæ black; proximal flagellar segments oval, with short apical pedicels, outer segments progressively longer, tapering gradually into long pedicels, terminal segment about one-half longer than the penultimate; verticils longer than the segments. Head with the broad anterior vertex bright silvery, remainder of head brown.

Thorax almost uniformly dark brown. Halteres elongate, stem dirty white, clearer at base, knob dark brown. Legs with coxæ and trochanters yellow, fore coxæ slightly darker; remainder of legs pale brown, the outer tarsal segments a little darker. Wings (Plate 1, fig. 11) tinged with brown, stigma oval, lightly darker; veins pale brown. Veins beyond cord with macrotrichia, lacking on *Rs*, very sparse on basal sections of *R*<sub>4+5</sub> and *Cu*<sub>1</sub>. Venation: *Sc*<sub>1</sub> ending opposite origin of *Rs*; cell 1st *M*<sub>2</sub> long, subequal to distal section of *M*<sub>1+2</sub>; *m-cu* subequal to distal section of *Cu*<sub>1</sub>, placed close to fork of *M*.

Abdomen, including hypopygium, dark brown. Male hypopygium (Plate 2, fig. 25) with the tergal lobes, *t*, about one-half as broad as the central emargination, provided with long coarse setæ. Basistyle, *b*, with ventromesal lobe obtuse. Dorsal dististyle, *d*, a simple gently curved rod, the tip acute; ventral style smaller than the basistyle, with relatively sparse setæ; rostral prolongation slender, at its base with a curved pale spine that is subequal in length but more slender than the prolongation. Gonapophysis, *g*, with mesal-apical lobe gently curved to subacute tip. Ædeagus very broad, tip obtuse, lateral shoulders virtually lacking, sides microscopically crenulate, without setulæ.

*Habitat*.—Assam.

Holotype, male, Sirhoi Kashong, Manipur, 6,000 feet, June 6, 1960 (Schmid).

*Limonia* (*Melanolimonia*) *evea* is most readily told from all other brown regional members of the subgenus by the hypopygial structure, especially of the ædeagus. Such similar species include *L. (M.) fulvonigrina* Alexander and *L. (M.) lakshmi* Alexander.

**LIMONIA (THRYPTICOMYIA) ESTIGMATA** sp. nov.

Plate 1, fig. 12.

General coloration of thorax light brown, the pleura more yellowed; tarsi chiefly snowy white, including the outer half of basitarsi. Wings uniformly whitish hyaline, entirely without pattern, including the stigma; veins brownish black; Sc long, Sc<sub>1</sub> ending immediately beyond origin of Rs, Sc<sub>2</sub> far retracted; R<sub>2+3</sub> very long, subequal to Rs; free tip of Sc<sub>2</sub> far distad, about twice its own length before R<sub>2</sub>.

*Female*.—Length, about 6.5 millimeters; wing, 7.

Rostrum brown; palpi brownish black. Antennæ with scape and pedicel brown, flagellum brownish black; flagellar segments elongate, with conspicuous apical pedicels; each flagellar segment beyond the second with a single very long verticil, the longest about twice the segment. Head dark brown.

Pronotum brownish black. Mesonotum light brown, pleura more yellowed. Halteres with stem brown, knob brownish black. Legs with coxæ and trochanters yellow; femora brown, paler basally; tibiæ brownish black; basitarsi with approximately the basal half blackened, the outer half and remainder of tarsi snowy white. Wings (Plate 1, fig. 12) uniformly whitish hyaline, entirely without pattern, including the stigma; veins brownish black, very conspicuous. Venation: Sc<sub>1</sub> ending

immediately beyond origin of  $R_s$ ,  $Sc_2$  far retracted,  $Sc_1$  alone only a little shorter than  $R_s$ ;  $R_{2+3}$  very long, subequal to  $R_s$  and longer than  $R_3$ ; free tip of  $Sc_2$  far distad, about twice its own length before  $R_2$ ; cell 1st  $M_2$  long, the inner end pointed; m-cu at near two-fifths  $M$ .

Abdominal tergites brown, basal sternites slightly paler, the outer ones more yellowed.

*Habitat*.—West Java.

Holotype, female, Mount Djampang, December 1933 (*M. E. Walsh*).

*Limonia* (*Thrypticomyia*) *estigmata* is readily told from other regional species by the entirely unpatterned wings, with no trace of the stigmal darkening almost invariably present. Certain other species, including *L. (T.) microstigma* Alexander, have this small but clearly evident.

*LIMONIA CONGESTA* sp. nov.

Plate 1, fig. 13.

Size small (wing of female 6.5 millimeters); mesonotum brown, lateral præscutal margins yellow, ventral thoracic pleura yellowish white; mouthparts reduced; antennæ black, proximal three to five flagellar segments short and crowded, broader than long, succeeding segments more elongate; halteres dark brown; legs with coxæ and trochanters yellow, the remainder of legs light brown, the middle and hind tarsi whitened, more extensively so on hind legs; terminal tarsal segment with a strong black nearly terminal spine, claws long, with a basal spur; wings light brown, restrictedly patterned with slightly darker brown, including vague seams over cord and outer end of cell 1st  $M_2$ , vein 2nd  $A$  long and gently sinuous; ovipositor with cerci relatively short, slender.

*Female*.—Length, about 5.5 millimeters; wing, 6.5; antenna, about 1.3.

Mouthparts reduced; palpi short, black, the outer segment long. Antennæ black; proximal three to five flagellar segments short and crowded, broader than long, the succeeding segments subglobular to oval, with short abrupt pedicels; terminal segment elongate, narrowed outwardly, about one-half longer than the penultimate; verticils of intermediate segments short, on outer segments longer. Front and genæ light yellow; anterior vertex broad, posterior vertex brown, yellowed medially behind.

Pronotum brownish yellow, with a few long erect bristles. Mesonotal præscutum with the disk medium brown, the stripes

confluent, lateral borders yellow behind; posterior sclerites of notum brown, median region of scutum and scutellum obscure yellow. Pleura below clear light yellowish white, including the sternopleurite and posterior sclerites; dorsal pleurites brown, forming a broad inconspicuous longitudinal stripe. Halteres dark brown. Legs with coxæ and trochanters yellow; remainder of legs light brown, terminal tarsal segment blackened; middle tarsi with apical half of second segment dirty white, posterior tarsi more evidently brightened, segment two white, three and four brownish white; claws long, with a basal spur; terminal tarsal segment with a strong black nearly terminal spine, its tip obtuse. Wings (Plate 1, fig. 13) light brown, restrictedly patterned with slightly darker brown, including poorly indicated seams over cord and outer end of cell 1st  $M_2$ ; stigma oval, darker brown; veins brown. Venation: Sc long,  $Sc_1$  ending about opposite midlength of Rs,  $Sc_2$  near its tip; m-cu at fork of M; vein 2nd A long, gently sinuous.

Abdominal tergites dark brown, sternites yellow. Ovipositor with cerci relatively short, slender, gently upcurved to the acute tips, base narrowly blackened; hypovalvæ longer and broader, whitened.

*Habitat*.—India (Sikkim).

Holotype, female, Zomphuk, 6,500 feet, October 1, 1959 (Schmid).

*Limonia congesta* is most like *L. aspropoda* Alexander, differing in the structure of the antennæ and claws, colorational pattern of the legs and wings, and in other characters. In the absence of the male sex I do not attempt to place this species in a subgenus.

#### Genus **HILIUS** Lepeletier and Serville

*Helius* LEPELETIER and SERVILE in Latreille, et al., Entom. 10 (1828) 831.

*Megarhina* LEPELETIER and SERVILE in Latreille, et al., Entom. 10 (1828) 585.

*Rhamphidia* MEIGEN, Syst. Besch. Zweif. Ins. 6 (1830) 281.

*Helius* is a major genus of crane flies with representatives in all biotic regions, including Madagascar and New Zealand. In India numerous species occur, particularly in the Himalayas and adjoining ranges.

The following subgeneric groups have been proposed:

*Helius* LEPELETIER and SERVILE in Latreille, et al., Entom. 10 (1828) 831.—Type—*longirostris* (Meigen). Distribution—Cosmopolitan.

- Eurhamphidia* ALEXANDER, Proc. U.S. Nat. Mus. 49 (1915) 168.—  
type—*niveitarsis* (Skuse). Distribution—Australasian, Oriental.  
*Rhampholimnobia* ALEXANDER, Proc. U.S. Nat. Mus. (1915) 168  
(as genus).—type—*reticularis* (Alexander). Distribution—Australasian, Oriental.  
*Rhamphidina* ALEXANDER, Ann. Mag. Nat. Hist. (9) 5 (1920)  
343.—type—*camerounensis* (Alexander). Distribution—Ethiopian.  
*Rhamphidioides* ALEXANDER, Ann. Mag. Nat. Hist. (9) 5 (1920)  
344-345.—type—*venustissima* (Alexander). Distribution—Ethiopian.  
*Idiohelius* ALEXANDER, Trans. Roy. Ent. Soc. London 99 (1948)  
382.—type—*pentaneura* Alexander. Distribution—Australasian.  
*Rhyncholimonia* ALEXANDER, Philip. Jour. Sci. 92 (1963) 400.—  
type—*dicroneurus* Alexander. Distribution—Australasian.

**HELIUS (HELIUS) ANAMALAIENSIS** sp. nov.

Plate 3, fig. 26; Plate 4, fig. 42.

General coloration of mesonotum and dorsal thoracic pleura dark brown, ventral pleurites more yellowed; antennæ with verticils of outer segments moderately long, slightly exceeding the segments; wings tinged with brown, cells C and Sc, with the extreme wing tip, slightly darker, branches of Rs relatively long and gradually divergent; male hypopygium with outer dististyle relatively stout, ædeagus strongly curved, its outer end narrowed.

*Male*.—Length, including rostrum, about 8 to 8.5 millimeters; wing, 7 to 7.8; rostrum alone, about 0.8; antenna, about 1.3.

Rostrum brownish black, shorter than remainder of head; palpi black. Antennæ black, about one-half longer than the rostrum; basal flagellar segments short-oval, outer segments longer, verticils of the more proximal segments unilaterally distributed, on outer six segments occurring on both surfaces, the outer verticils of moderate length only, slightly exceeding the segments; terminal segment long and slender, exceeding the penultimate. Head blackened.

Pronotal scutum light brown, scutellum slightly more yellowed. Mesonotal præscutum almost uniformly dark brown, the sides a little paler; posterior sclerites brown, callosities of scutal lobes and surrounding sclerites more yellowed; setæ of pronotum and mesonotum long, erect, lacking on postnotum. Pleura dark brown above, ventral sclerites more yellowed. Halteres dark brown. Legs with coxæ light brown, fore pair darker, mid-coxæ with long black setæ; trochanters obscure yellow; femora and tibiæ brown, tarsi beyond the base somewhat paler brown. Wings (Plate 3, fig. 26) tinged with brown, cells C and Sc, together with the extreme wing tip, slightly



darker, stigma more intensely infuscated; veins brown. Costal fringe and macrotrichia of veins of moderate length. Venation;  $Sc_1$  and  $Sc_2$  slightly beyond level of fork of Rs, branches of the latter longer and more gradually divergent than in *fuscoangustus*; m-cu shortly before fork of M.

Abdomen, including hypopygium, brownish black. Male hypopygium (Plate 4, fig. 42) with the outer dististyle, *d*, relatively stout, the apical points small, obtuse; inner style with the narrowed apical part shorter than in *fuscoangustus*. Aedeagus, *a*, strongly curved, the outer end narrowed.

*Habitat*.—South India.

Holotype, male, Cinchona, Anamalai Hills, 3,500 feet, May 1965 (*P. Susai Nathan*). Paratopotype, 1 male.

*Helius (Helius) anamalaiensis* is most similar to *H. (H.) fuscoangustus* sp. nov., differing especially in the antennal structure and in slight details of venation and hypopygial structure, as described.

**HELIUS (HELIUS) APOPHYSALIS** sp. nov.

Plate 3, fig. 27; Plate 4, fig. 43.

General coloration of thorax brownish yellow; rostrum brownish black, shorter than the antennæ; outer antennal verticils relatively short; wings light brown, stigma slightly indicated; male hypopygium with setæ of inner dististyle and basistyle relatively sparse and weak; gonapophysis a long pale scimitar-shaped blade; aedeagus elongate, narrowed and recurved outwardly.

*Male*.—Length, including rostrum, about 6 millimeters; wing, 6; rostrum alone, about 1.0 to 1.1; antenna, about 1.6.

Rostrum brownish black, shorter than the antennæ; palpi brown, third segment paler, terminal segment elongate, subequal in length to the preceding three combined. Antennæ with proximal flagellar segments suboval, longer than broad, outer segments gradually lengthened and more slender; outer verticils of moderate length, on the penultimate the longest just exceeding the segment; terminal segment slender, slightly longer than the penultimate. Head dark brown.

Thorax brownish yellow, sides of præscutum more yellowed; scutellum and mediotergite slightly darker. Halteres infuscated, base of stem yellowed. Legs with coxæ and trochanters yellow, fore coxæ slightly darker; remainder of legs yellowish brown to light brown. Wings (Plate 3, fig. 27) with a light brown tinge, prearcular and costal fields slightly more yellowed, stigma faintly indicated, veins brown, more brownish yellow in the

brightened fields. Venation:  $Sc_1$  ending about opposite the posterior end of the oblique r-m; branches of Rs moderately divergent, cell  $R_4$  at margin only slightly more extensive than cell  $R_5$ , the latter slightly narrowed at margin; cell 1st  $M_2$  rectangular, subequal in length to vein  $M_4$ ; m-cu from about one-third to one-fifth its length beyond the fork of M.

Abdominal tergites dark brown, sternites yellowed, subterminal segments more uniformly darkened to form a ring; hypopygium brownish yellow. Male hypopygium (Plate 4, fig. 43) with the outer dististyle,  $d$ , a slender nearly straight glabrous black rod, the apex unequally bilobed; inner style a little longer, the basal two-thirds stouter, with sparse weak setæ. Basistyle without a modified lobe on mesal face. Gonapophysis,  $g$ , distinctive, the outer blade longer than the dististyles, appearing as a gently curved pale scimitar, its tip acute.  $\mathcal{A}$ edeagus about as long as the gonapophysis, gradually narrowed outwardly, tip strongly recurved.

*Habitat*.—India (Sikkim).

Holotype, male, Mangang, 3,600 feet, May 9, 1959 (*Schmid*). Paratypes, 2 males, Aritar, 4,920 feet, September 5, 1959; 1 male, Dikchu, 2,300 feet, May 9, 1959 (*Schmid*).

*Helius* (*Helius*) *apophysalis* is quite distinct from all other regional medium-sized members of the genus having unpatterned wings in the hypopygial characters, especially the gonapophyses.

HELIUS (HELIUS) CATREUS sp. nov.      Plate 3, fig. 28; Plate 4, fig. 44.

Allied to *pavoninus*; general coloration of mesonotal præscutum obscure yellow to brown with a darker brown central stripe; rostrum shorter than antennæ; flagellum obscure yellow to light brown; femora yellow with a conspicuous black subterminal ring, remainder of legs yellow; wings light yellow, conspicuously patterned with brown, the costal region usually more or less darkened except on the central part, the pale ground including two broad nearly complete bands placed before and beyond the cord; male hypopygium with outer dististyle gently widened outwardly, the axial spine curved.

*Male*.—Length, including rostrum, about 6 to 9 millimeters; wing, 7 to 9; rostrum alone, 0.7 to 1.0; antenna, 1.2 to 1.3.

*Female*.—Length, including rostrum, about 7 to 9 millimeters; wing, 8 to 9; rostrum alone, 0.8 to 0.9.

Rostrum black, shorter than the antennæ; palpi black. Antennæ with scape and pedicel black, flagellum obscure yel-

low to light brown; basal flagellar segments short-oval, the outer ones longer. Head black, sparsely pruinose; anterior vertex narrow.

Cervical sclerites black. Pronotum brown. Mesonotal præscutum obscure yellow to brown with a conspicuous darker brown central stripe, lateral borders behind the humeri extensively dark brown; scutal lobes dark brown, median region and scutellum testaceous brown to brown; postnotum dark brown, pleurotergite somewhat paler. Pleura brownish black, dorsopleural region darkened. Halteres light yellow. Legs with coxæ black; trochanters obscure yellow; femora light yellow with a conspicuous black subterminal ring, more extensive than the yellow apex; tibiæ light yellow, in cases the bases vaguely more darkened; tarsi yellow, outer segments weakly darkened. Wings (Plate 3, fig. 28) light yellow, conspicuously patterned with brown, in some specimens, including the type, with the basal and outer thirds of costal region pale brown restricting the yellow about to the central third, in other specimens with the prearcular and costal fields uniformly clear yellow; disk with the yellow ground subequal to or exceeding the darkened pattern being especially evident as broad nearly complete bands before origin of Rs and beyond the cord; cells  $R_2$  and  $R_3$  chiefly yellow, with a darkened area at the end of vein  $R_3$ , more evident in the type; veins brown, yellowed in the brightened areas. Venation: Vein  $R_{4+5}$  in direct alignment with Rs;  $r-m$  variable in position, commonly close to fork of Rs, in case a short distance beyond; Rs spurred near origin;  $m-cu$  at near midlength of  $M_{3+4}$ ; cell 1st  $M_2$  subrectangular.

Abdomen black, commonly with the central region more yellowed or reddened, subterminal segments uniformly blackened to form a ring; hypopygium obscure yellow to brown. Male hypopygium (Plate 4, fig. 44) generally as in *pavoninus* and *taos*. Basistyle, *b*, broad at base, with relatively sparse setæ. Dististyle, *d*, terminal, outer style glabrous, gently widened outwardly, the axial spine curved at lower apical angle, with a slightly smaller lateral point at the outer angle; inner style longer, unusually glabrous, basal inner margin with four modified setæ. Gonapophysis, *g*, and ædeagus as figured.

*Habitat*.—India (Kumaon, Sikkim).

Holotype, male, Saran, Almora, Kumaon, 7,200 feet, September 17, 1958 (Schmid). Allotype, female, Dhur, Almora,

Kumaon, 7,400 feet, September 9, 1958 (*Schmid*). Paratopotypes, 2 females, with type. Paratypes, 4 males, with allotype; 3 males, Khati, Almora, 7,700 feet, September 10, 1958; 1 male, Padamchen, Sikkim, 7,060 feet, August 29, 1959; males and females, Zomphuk, Sikkim, 6,500 feet, October 1, 1959 (*Schmid*).

*Helius (Helius) catreus* is readily told from the other members of the *pavoninus* group, *H. (H.) pavoninus* Alexander and *H. (H.) taos* sp. nov., by the subterminal blackened femoral rings, additional to differences in wing pattern and hypopygial structure. The names of all three members of the group as presently known are in allusion to the peacock, *Pavo*, and were suggested by the attractively patterned wings of the species.

**HELIUS (HELIUS) COMPACTUS** sp. nov.

Plate 3, figs. 29, 38; Plate 4, fig. 45.

Size small (wing of male 5.5 millimeters); mesonotum dark brown, sides of præscutum yellow; pleura and pleurotergite yellow; antennæ slightly longer than the rostrum, proximal two segments of flagellum enlarged and crowded, oval, outer segments longer; wings subhyaline, stigma pale brown,  $Sc_1$  ending about opposite five-sixths  $Rs$ ,  $Sc_2$  near its tip, cell 1st  $M_2$  small; abdomen yellowish brown above, sternites and hypopygium yellowed, subterminal segments darker to form a ring; male hypopygium with both dististyles pale; ædeagus a slender straight pale rod.

*Male*.—Length, including rostrum, about 5.5 millimeters; wing, 5.5; rostrum alone, about 0.65; antenna, about 0.8.

Rostrum relatively short, less than the antennæ, dark brown; palpi subequal to second and third combined. Antennæ (Plate 3, fig. 38) distinctive, relatively short; proximal two flagellar segments large, closely approximated or partially fused to form an oval structure that is similar in shape but smaller than the pedicel; flagellar segments three and four short, transverse, crowded; succeeding segments more lengthened, the outer four broken. Head dark brown.

Pronotum brown above, sides obscure yellow. Mesonotal præscutum with a discal brown area comprised of confluent stripes, lateral and humeral borders broadly yellow; scutal lobes dark brown, central area paler; scutellum and mediotergite dark brown, parascutella obscure yellow. Pleura and pleurotergite uniformly yellow. Halteres with stem dirty white, knob brown. Legs with coxæ and trochanters yellow, the latter

blackened beneath at apex; remainder of legs brown, extreme tip of tibia and the tarsi yellowish white. Wings (Plate 3, fig. 29) subhyaline, prearcular and costal fields slightly more yellowed; stigma oval, pale brown; veins light brown. Macrotrichia on Rs and on veins beyond cord. Venation: Sc relatively long, Sc<sub>1</sub> ending about opposite five-sixths to six-sevenths Rs, Sc<sub>2</sub> near its tip; branches of Rs strongly divergent, cell R<sub>2</sub> at margin about one-fourths Rs, vein R<sub>4+5</sub> ending close to wing tip, slightly narrowing cell R<sub>5</sub> at margin; cell 1st M<sub>2</sub> pentagonal, shorter than vein M<sub>4</sub>; m-cu about one-fourth its length beyond fork of M.

Abdomen light yellowish brown, sternites and hypopygium paler yellow, segments seven and eight darker brown to form a ring. Male hypopygium (Plate 4, fig. 45) with the basistyle, *b*, stout, without lobes, setæ pale and inconspicuous. Outer dististyle, *d*, small, pale, its apex strongly curved into a point, with a small lateral spine near its base; inner style pale, with sparse small weak setæ, the outer narrowed part shorter than the base. Phallosome with gonapophysis, *g*, pale, its marginal outline difficult to see on a slide mount, the distal end extended into a strong spine. Ædeagus a slender straight pale rod.

*Habitat*.—India (Sikkim).

Holotype, male, Dikchu, 2,300 feet, May 9, 1959 (Schmid).

*Helius* (*Helius*) *compactus* differs from other small regional species that have the mesonotum darkened and the rostrum short by the unusual structure of the antennal flagellum and the pale hypopygial dististyles. *H. (H.) inconspicuus* (Brunetti) has the thoracic dorsum light yellowish brown and the halteres yellowish. The structure of the proximal segments of the antennal flagellum in *inconspicuus* was not described by Brunetti.

**HELIUS (HELIUS) FUSCOANGUSTUS** sp. nov. Plate 3, fig. 39; Plate 4, figs. 46, 47.

General coloration of mesonotal præscutum light brown, posterior sclerites darker brown, pleura fulvous yellow; rostrum shorter than antennæ; halteres black; legs with femora and tibiæ black, tarsi paler; wings subhyaline, cells C and Sc, together with the wing tip, infuscated, stigma slightly darker; cell R<sub>3</sub> at margin very extensive, cell 1st M<sub>2</sub> small, m-cu at or before fork of M; male hypopygium with outer dististyle a very slender nearly straight black rod, its shallowly bidentate.

*Male*.—Length, including rostrum, about 5 to 5.5 millimeters; wing, 6 to 6.5; rostrum alone, about 0.6 to 0.65; antenna, about 0.8 to 0.9.

*Female*.—Length, including rostrum, about 5.5 millimeters; wing, 6.

Rostrum shorter than antennæ, pale at base, dark brown to black outwardly; palpi black. Antennæ black; proximal flagellar segments oval, the length slightly exceeding the breadth, verticils relatively short; outer segments elongate, with long verticils. Head brownish black.

Cervical region and pronotal scutum dark brown, scutellum brownish yellow. Mesonotal præscutum light fulvous brown, slightly darker medially; posterior sclerites of notum darker brown, central region of scutum, parascutella and pleurotergite fulvous brown. Pleura fulvous yellow, dorsopleural region more darkened. Halteres black, base of stem restrictedly yellowed. Legs with coxæ and trochanters yellow, femora and tibiæ black, outer tarsal segments paling to obscure yellow. Wings (Plate 3, fig. 30) subhyaline, cells C and Sc, with the broad apex light brown, stigma slightly darker brown; veins brownish black. Macrotrichia on longitudinal veins beyond cord, on  $M_4$  restricted to outer half, before cord with trichia on Rs, lacking on Sc. Venation: Sc relatively long,  $Sc_1$  ending just before level of fork of Rs,  $Sc_2$  at its tip; branches of Rs strongly divergent, cell  $R_3$  at margin very extensive; cell 1st  $M_2$  small, subquadrate to pentagonal in outline; m-cu at or before fork of M.

Abdominal segments black, hypopygium brownish yellow. Male hypopygium (Plate 4, fig. 47) with basistyle, *b*, stout, mesal face without a lobe but with abundant erect setæ, those at apex and outer face of style more sparse, relatively stout. Outer dististyle, *d*, a very slender blackened rod, nearly straight, tip very shallowly bidentate; inner style longer, the outer third narrowed and gently curved. Gonapophysis, *g*, as figured, the apex of outer blade obtuse. Ædeagus only gently curved.

*Habitat*.—South India (Mysore).

Holotype, male, Kokankote, 2,450 feet, January 10, 1959 (*Schmid*). Allotopotype, female, pinned with type. Paratopotype, 1 male, pinned with type. Paratypes, 1 male, Honnatlu, 2,700 feet, January 20, 1959; 1 male, Yodpa, 2,000 feet, January 16, 1959 (*Schmid*).

*Helius (Helius) Fuscoungustus* is generally similar to *H. (H.) fratellus* (Brunetti), differing conspicuously in the hypopygial structure, especially the styli. The hypopygium of *fratellus* is shown for comparison (Plate 4, fig. 46).

**HELIUS (HELIUS) IMPENSUS** sp. nov.

Plate 3, figs. 31, 39, 40; Plate 5, fig. 48.

Size very large (wing about 10 millimeters); rostrum shorter than the antennæ, proximal flagellar segments of latter not short and crowded; general coloration of body dark brown; knobs of halteres brownish black; legs black, in cases the tarsi slightly paler; wings weakly infuscated, costal region and stigma darker; male hypopygium with a large lobe on mesal face of basistyle; outer dististyle nearly straight, blackened, tip very shallowly bidentate; gonapophysis a short blade with a strong spine across face at near midlength.

*Male*.—Length, including rostrum, about 10 to 11 millimeters; wing, 9 to 11; rostrum alone, 0.8 to 1; antenna, about 1.2 to 1.3.

*Female*.—Length, including rostrum, about 10 to 11 millimeters; wing, 9 to 10; rostrum alone, 0.8 to 0.9; antenna, 1.2 to 1.3.

Rostrum shorter than the antennæ, brownish black, terminal segment of palpus exceeding the combined segments two and three. Antennæ (Plate 3, fig. 39) longer than rostrum; proximal flagellar segments suboval, longer than broad, outer segments longer and more slender; verticils of outer segments much shorter than in *murrensensis* (Plate 3, fig. 40), scarcely longer than the segments. Head brownish black; anterior vertex narrow.

Thorax brown to dark brown, the præscutum with a slightly more blackened central stripe on anterior half; vague more yellowed areas on midregion of scutum and center of suture, at the interpostnotal suture and in cases on the pleura. Halteres infuscated, knob slightly darker. Legs with coxæ brown, trochanters more brownish yellow; femora and tibiæ black, tarsi in cases slightly paler. Wings (Plate 3, fig. 31) weakly infuscated, cells C and Sc, together with the long stigma, slightly darker brown; veins brown. Rs and longitudinal veins beyond cord with numerous macrotrichia. Venation: Sc long, Sc<sub>2</sub> ending nearly opposite fork of Rs, the branches of the latter gently divergent, cell R<sub>2</sub> at margin about one-third as extensive as R<sub>3</sub>; r-m and basal section of R<sub>4+5</sub> subequal; cell



1st.  $M_2$  irregularly rectangular, m slightly oblique, subequal to or longer than basal section of  $M_3$ .

Abdominal tergites brownish black to black, sternites and hypopygium more brownish yellow. Male hypopygium (Plate 5, fig. 48) with a conspicuous lobe on mesal face of basistyle, *b*, that is provided with coarse black setæ, elsewhere these long and delicate. Outer dististyle, *d*, a stout nearly straight black rod, narrowed to the very inconspicuously bidentate tip; inner style with the enlarged base on lower face with long setæ, the gently arcuated outer half with a single row of about 15 setæ. Phallosome with gonapophyses appearing as short blades, each with a long acute spine across the face at base; ædeagus short, the recurved tip very short, the internal genital tube large.

*Habitat*.—India (Kumaon, Sikkim).

Holotype, male, Tikjak, Sikkim, 4,900 feet, April 7, 1959 (*Schmid*). Allotopotype, female, pinned with type. Paratopotypes, several of both sexes, with the types. Paratypes, both sexes, Dharmdin, Sikkim, 2,854 to 3,200 feet, March 18, 1959; both sexes, Nampang, Sikkim, 3,280 feet, May 9, 1959; 1 male, Palam Sikkim, 5,100 feet, April 25, 1959; Samdong, Sikkim, 4,200 feet, March 31, 1959; 2 males, Singbang, 4,920 feet, April 26, 1959; 2 males, Lingsoka, West Bengal, 3,930 to 4,500 feet, September 7–10, 1959; 1 male, Dehra Dun, Kumaon, Rishikesh, 1,200 feet, March 26, 1958 (all *Schmid*).

*Helius* (*Helius*) *impensus* is the largest regional member of the genus. It is most similar to *H. (H.) murreensis* Alexander, of the western Himalayas, still known only from the female sex. In this sex the two flies are told most readily by the antennal structure, as compared above (*impensus* paratype female, Plate 3, fig. 39; *murreensis*, holotype female, Plate 3, fig. 40).

**HELIUS (HELIUS) NUMENIUS** sp. nov.

Plate 3, fig. 32; Plate 5, fig. 49.

Size relatively large (wing of male 9 millimeters); rostrum relatively short, less than one-half the antennæ; wings whitened, conspicuously patterned with brown, prearcular and costal fields more yellowed; basistyle of male hypopygium with a tubercle on proximal end of mesal face; outer dististyle a straight simple black rod, tip simple; inner style shaped like the head of a curlew.

*Male*.—Length, including rostrum, about 9 millimeters; wing, 9; rostrum alone, about 1; antenna, about 2.3.

Rostrum relatively short, slightly exceeding the remainder of head and less than one-half the antenna, brownish black; palpi black. Antennæ with scape black, pedicel yellowish brown, flagellum black, proximal half of the long basal segment yellowed; flagellar segments elongate, becoming progressively shorter outwardly, with dense short white setæ and slightly longer verticils. Head dark gray, the front and narrow anterior vertex more silvery gray, the latter about one-third the diameter of scape; genæ with long black setæ.

Cervical sclerites pale brown; pronotum yellow. Mesonotal præscutum and scutum almost uniformly fulvous yellow, the three præscutal stripes very ill-defined against the more yellowed interspaces; scutellum brown, posterior border narrowly yellow, parascutella testaceous; mediotergite brownish yellow, slightly darker anteriorly; pleurotergite yellow. Pleura obscure yellow, the anepisternum and dorsopleural membrane more darkened. Halteres yellow, base of knob weakly darkened. Legs with coxæ and trochanters yellow; femora yellowish brown, passing into obscure yellow, tips broadly black; tibiæ brown, tarsi paler brown. Wings (Plate 3, fig. 32) whitened, conspicuously patterned with brown, prearcular and costal fields more yellowed; the dark marks include the stigma and areas at origin of Rs, cord, outer end of cell 1st  $M_2$ , and somewhat paler clouds at apex, end of vein Cu and margins of anal cells; a very small darkening in base of cell M; veins dark brown, pale brown in costal field, yellowed in prearcular region. Venation:  $Sc_1$  ending about opposite the posterior end of the short-rectangular cell 1st  $M_2$ ,  $Sc_2$  at its tip, r-m shortly before fork of Rs, the branches of the latter generally parallel, cell  $R_2$  at margin about two and one-half times cell  $R_4$ ; vein  $M_4$  more than twice as long as cell 1st  $M_2$ ; m-cu at or before midlength of  $M_{3+4}$ ; cell 2nd A relatively broad.

Basal abdominal tergites brownish yellow, sternites light yellow, segment six through eight black to form a broad ring; hypopygium brownish yellow. Male hypopygium (Plate 5, fig. 49) with the basistyle, *b*, relatively long, the proximal end of mesal face with a large oval lobe. Outer dististyle, *d*, a slender black nearly straight rod, the apex virtually entire; inner style distinctive in shape, basal half stout, thence constricted into a small oval head that is extended into a slender gently decurved beak, the margin beneath this with a group of dark colored setæ; the style resembles the head of an ibis or a curlew (*Numenius*) and has suggested the specific name.

*Habitat*.—India (Sikkim).

Holotype, male, Lachen, 8,900 feet, June 13, 1959 (Schmid).

The peculiar structure of the inner dististyle of the hypopygium readily distinguishes the present fly from all others, including the somewhat similar *Helius* (*Helius*) *euryphallus* Alexander.

**HELIUS (HELIUS) OXYSTYLUS** sp. nov.

Plate 3, figs. 33, 41; Plate 5, fig. 50.

General coloration of thorax yellow; antennæ about one-half longer than the rostrum, scape yellow, remainder of organ brown; halteres and legs yellow; wings yellowed, stigma very pale brown; abdomen brownish yellow, subterminal segments darker; male hypopygium with both dististyles with tips pointed, outer style blackened, narrowed to a terminal spine, inner style broader, with relatively sparse setæ.

*Male*.—Length, including rostrum, about 4.8 to 5 millimeters; wing, 5.2 to 5.4; rostrum alone, about 0.6 to 0.7; antenna, about 1.0.

Rostrum obscure yellow, with a capillary blackened line; palpi brownish black. Antennæ (Plate 3, fig. 41) about one-half longer than the rostrum; scape obscure yellow, remainder brownish black, in the type the bases restrictedly paler; pedicel and proximal flagellar segments short-suboval, at near midlength the segments becoming oval, terminal segment about one-third longer than the penultimate; verticils subequal to or slightly longer than the segments. Head buffy gray; anterior vertex narrow.

Cervical region brownish yellow. Thorax almost uniformly yellow; setæ of pronotum sparse but long, much shorter on mesonotum. Halteres yellow. Legs yellow, including the outer segments. Wings (Plate 3, fig. 33) yellowed, prearcular and costal fields clear light yellow; stigma very pale brown, scarcely darker than the ground; veins pale brown. Relatively sparse macrotrichia on Rs and veins beyond cord, lacking on Cu<sub>1</sub>. Venation: Sc<sub>1</sub> ending shortly before fork of Rs, Sc<sub>2</sub> longer; basal section of R<sub>4+5</sub> longer than r-m; m-cu about one-third its length beyond fork of M.

Abdomen brownish yellow, hypopygium clearer yellow; segments seven and eight darker brown to form a narrow ring. Male hypopygium (Plate 5, fig. 50) with the basistyle, *b*, relatively slender, mesal face with numerous strong dark bristles but without a lobe, at cephalic end produced into two glabrous blades. Dististyle, *d*, terminal, unusually large as compared

to the basistyle, especially the inner; both styles terminating in an acute point; outer style more slender, blackened, gradually narrowed to a point, on lower margin back from tip with a microscopic triangular point; inner style pale, broad, setæ relatively sparse. Gonapophysis, *g*, extended into a strong lateral spine. Aedeagus with about the outer half narrowed and strongly recurved to the slender apex.

*Habitat*.—India (Sikkim).

Holotype, male, Nanga, 5,000 feet, May 11, 1959 (*Schmid*). Paratopotype, 1 male, pinned with type. Paratypes, 1 male, Lingdok, 4,600 feet, May 7, 1959; 1 male, Nampung, 3,280 feet, May 8, 1959 (*Schmid*).

*Helius* (*Helius*) *oxystylus* is told most readily by the antennal and hypopygial structure, especially the pointed dististyles.

**HELIUS (HELIUS) SERENUS** sp. nov.

Plate 3, fig. 34; Plate 5, fig. 52.

General coloration of thorax fulvous yellow; rostrum brownish black, subequal in length to antenna or to remainder of head; proximal flagellar segments short, transverse, outer segments longer, the verticils of moderate length; halteres infuscated; legs dark brown, outer tarsal segments light yellow; wings hyaline, stigma pale brown; vein *Sc*<sub>1</sub> present, branches of *Rs*, very strongly divergent, cell *R*<sub>2</sub> at margin about one-sixth to one-seventh as extensive as cell *R*<sub>3</sub>; abdomen brownish yellow above, clearer yellow beneath, without a darker subterminal ring; male hypopygium with outer dististyle black, apex shallowly bidentate; aedeagus narrowed to a long acute point.

*Male*.—Length, including rostrum, about 4.6 to 5 millimeters; wing, 5 to 6; rostrum alone, about 0.7 to 0.8; antenna, about 0.65 to 0.8.

Rostrum brownish black, subequal to the antenna or to remainder of head; palpi black. Antennæ black; proximal flagellar segments short, transverse, the outer ones longer but slightly less than their verticils. Head dark brownish gray.

Thorax almost uniformly fulvous yellow, præscutum with a vague darker central stripe that is best indicated anteriorly; pronotal scutum with long erect setæ, vestiture of mesonotum very short and sparse. Halteres infuscated, base of stem narrowly yellowed. Legs with coxæ and trochanters fulvous yellow; femora, tibiæ and proximal third of basitarsi dark brown, outer tarsal segments light yellow. Wings (Plate 3, fig. 34) hyaline, stigma oval, pale brown; veins darker brown.

Longitudinal veins beyond cord with macrotrichia, sparse on  $Cu_1$ ,  $Rs$  with a complete series. Venation:  $Sc_1$  ending about opposite three-fourths  $Rs$ ,  $Sc_2$  subequal; branches of  $Rs$  very strongly divergent, cell  $R_2$  at margin about one-sixth to one-seventh as extensive as cell  $R_3$ ;  $r-m$  subequal to basal section of  $R_{4+5}$ ; cell 1st  $M_2$  almost square,  $m$  the shortest element, all veins beyond it much longer;  $m-cu$  before fork of  $M$ .

Abdominal tergites brownish yellow, sternites somewhat clearer yellow; no darkened subterminal ring; hypopygium brownish yellow. Male hypopygium (Plate 5, fig. 52) with the basistyle, *b*, unmodified, mesal face with abundant erect black setæ but without lobes. Outer dististyle, *d*, a nearly straight black rod, the tip very shallowly bidentate, the axial point more curved and pointed, base of inner style with long setæ on inner surface. Gonapophysis as figured.  $\mathcal{A}$ edeagus gradually narrowed to a long acute point.

*Habitat*.—India (Kumaon).

Holotype, male, Rishikesh, Dehra Dun, 1,200 feet, March 31, 1958 (*Schmid*). Paratopotype, 1 male, pinned with type.

*Helius* (*Helius*) *serenus* is generally similar to *H.* (*H.*) *inconspicuus* (Brunetti), from the Darjiling District, India, which was described as having the rostrum and halteres yellowed and with slight differences in venation. I have not seen materials that could be referred to this species with certainty.

**HELIUS (HELIUS) STENORHYNCHUS CORACINUS** subsp. nov.

*Male*.—Length, including rostrum, about 8 millimeters; wing, 8; rostrum alone, about 2.5; antenna, about 2.5.

*Female*.—Length, including rostrum, about 8.5 millimeters; wing, 8; rostrum alone, about 2.5.

Characters as in typical *stenorhynchus*, differing chiefly in body coloration. Rostrum black, very long, nearly twice the antenna. Antennæ black; basal flagellar segments rounded to slightly transverse, at near the fifth segment becoming longer than broad, thence outwardly becoming gradually more lengthened; terminal segment longer than the penultimate; outer segments a little shorter than their verticils. Head dark gray.

Thorax intensely black, slightly more reddened at the præscutal humeri; ends of transverse suture, dorsopleural membrane and parascutella yellowed. Halteres yellow. Legs with coxæ and trochanters light yellow; femora pale brown, passing into brownish black at tips; tibiæ light brown, tarsi more yellowed.

Wings with coloration and venation virtually as in the typical race. Abdominal tergites black, sternites and hypopygium slightly more reddened. Male hypopygium virtually as in typical *stenorhynchus*.

*Habitat*.—India (Sikkim).

Holotype, male, Manu, 4,920 feet, May 10, 1959 (*Schmid*). Allotopotype, female. Paratopotype, 1 male, pinned with the type.

The present fly is very similar to *Helius* (*Helius*) *stenorhynchus* Alexander (Northeastern Burma), differing especially in the intensely black coloration of the thorax.

**HELIUS (HELIUS) TANTALUS** sp. nov.

Plate 3, fig. 35; Plate 5, fig. 51.

General coloration of thorax light yellow, dorsal pleurites darkened; rostrum black, less than one-half the antennæ; knobs of halteres dark brown; legs obscure yellow; wings whitened, restrictedly patterned with brown, including seams over cord and outer end of cell 1st  $M_2$ , together with spots at arculus and at origin of Rs; vein Sc unusually long, with macrotrichia on its outer two-thirds; abdominal tergites brownish black, sternites and hypopygium yellowed, subterminal segments blackened to form a ring.

*Male*.—Length, including rostrum, about 6.5 millimeters; wing, 7; rostrum alone, about 0.6 to 0.7; antenna, about 1.8 to 1.9.

*Female*.—Length, including rostrum, about 7 millimeters; wing, 7; rostrum, about 0.8; antenna, about 1.6.

Rostrum black, in male less than one-half the antennæ; palpi black. Antennæ of male relatively long, black; flagellar segments long, exceeding their verticils, the outer segments progressively shorter, terminal segment about two-fifths the penultimate; in the female, antennæ somewhat shorter, terminal segment exceeding one-half the penultimate. Head dark gray; anterior vertex narrow.

Pronotum testaceous yellow. Mesothorax light yellow, dorsal pleura with a diffuse dark brown longitudinal stripe. Halteres with stem obscure yellow, clearer at base, knob dark brown. Legs with coxæ and trochanters yellow; remainder of legs obscure yellow. Wings (Plate 3, fig. 35) whitened, restrictedly patterned with brown, including small spots at arculus and origin of Rs; narrow seams at cord and outer end of cell 1st  $M_2$ ; stigma brown, conspicuous; veins yellow, brown in the patterned areas. Abundant macrotrichia on Rs and all longitudinal veins beyond cord; further trichia on outer half

of  $M$ , outer end of basal section of  $Cu_1$ , and sparsely at end of 2nd  $A$ ; outer two-thirds of vein  $Sc$  with trichia. Venation:  $Sc$  unusually long,  $Sc_1$  ending shortly beyond level of fork of  $Rs$ ;  $r-m$  longer than basal section of  $P_{3+4}$ ;  $m-cu$  at from one-third to two-fifths  $M_{4+5}$ .

Abdominal tergites brownish black, sternites brownish yellow, subterminal segments blackened to form a ring; hypopygium yellowed. Male hypopygium (Plate 5, fig. 51) with the basistyle,  $b$ , elongate, the mesal face with a conspicuous tubercle that bears abundant black setæ. Outer dististyle,  $d$ , blackened, gently curved and gradually narrowed to the truncated apex, with a small obtuse projection before tip and a further obtuse lobe still more basad; inner style with outer half slender.

*Habitat*.—India (Sikkim).

Holotype, male, Manu, 4,920 feet, May 10, 1959 (*Schmid*). Allotopotype, female. Paratopotypes, 8 of both sexes, with the types.

In its general appearance, including the somewhat lengthened antennæ, the present fly resembles the Formosan *Helius* (*Helius*) *subfasciatus* Alexander but is entirely different in the hypopygial structure.

**HELIUS (HELIUS) TAOS** sp. nov.

Plate 3, fig. 36; Plate 5, fig. 54.

Allied to *pavoninus*; general coloration of thorax and abdomen black, the præscutum, scutum and scutellum chestnut brown; legs yellow, femoral tips broadly black, tibiæ with extreme base and apex blackened; wings pale creamy yellow, attractively patterned with dark and pale brown, the prearcular and costal fields clear light yellow.

*Male*.—Length, including rostrum about 8 millimeters; wing, 6.5 to 8; rostrum alone, about 0.8 to 1.0; antenna, about 1.0 to 1.2.

*Female*.—Length, including rostrum, about 11 millimeters; wing, 10; rostrum alone, about 1; antenna, about 0.8 to 1.0.

Rostrum black, relatively short, subequal to the antenna; palpi black. Antennæ with scape and pedicel black, flagellum light yellow; flagellar segments suboval. Head black; eyes large, anterior vertex reduced to a narrow strip.

Cervical region and pronotum black. Mesonotal præscutum, scutum and scutellum chestnut brown, darker brown laterally, postnotum brownish black. Pleura brownish black, including the dorsopleural region. Halteres light yellow. Legs with coxæ black; trochanters brown, blackened beneath, femora



light yellow, tips broadly blackened; tibiae yellow, base and tip very narrowly blackened; tarsi yellow, outer segments darker. Wings (Plate 3, fig. 36) handsomely patterned; ground color pale creamy white, the costal and broad prearcular region clear light yellow; stigma and a narrow marginal seam beyond it to wing tip dark brown, in the more heavily patterned specimens extended proximad over Rs to its origin, including all of cell  $R_1$ ; extensive paler brown clouds in bases of cells R posteriorly through 2nd A, center of cell M and outer end of cell R, cord, outer end of cell 1st  $M_2$  and the wing tip; large areas of the pale ground in outer ends of cells R and M and center of 1st  $M_2$ , the pale areas beyond cord very extensive; veins pale yellow in the ground, brown in the patterned areas. Venation:  $Sc_1$  ending shortly before fork of Rs,  $Sc_2$  near its tip; Rs relatively short, in cases angulated near origin; branches of Rs divergent, cell  $R_3$  at margin more than twice cell  $R_2$ ; m-cu shortly before midlength of  $M_{3+4}$ .

Abdomen black, vaguely more reddened medially, hypopygium black. Male hypopygium (Plate 5, fig. 54) with basistyle, *b*, stout, simple. Outer dististyle, *d*, small, curved gradually to an acute point, with a small lateral spur, tip truncate; inner style nearly twice as long, its outer half gently curved, tip obtuse.

*Habitat*.—India (Sikkim, West Bengal).

Holotype, male, Zema, Sikkim, 8,900 feet, June 11, 1959 (Schmid). Allotype, female, Lachung, 8,610 feet, July 2, 1959. Paratopotype, 1 male. Paratypes, males and females with the allotype, July 2–7, 1959; 1 male, Lathong, Sikkim, 6,560 feet, July 26, 1959; 1 female, Namrasa, Sikkim, 9,500 feet, July 13, 1959; 1 female, Kurseong, West Bengal, 5,455 feet, September 6, 1958 (A. Camilleri).

*Helius* (*Helius*) *taos* is allied to *H. (H.) pavoninus* Alexander and *H. (H.) catreus* sp. nov., all three being generally similar to one another but quite distinct in the coloration of the legs and wings and in details of hypopygial structure.

**HELIUS (HELIUS) VERTICILLATUS** sp. nov.

Plate 3, fig. 37; Plate 5, fig. 53.

General coloration of thorax brown, the pleura slightly paler brown; antennae a little longer than the rostrum, the outer five segments with unusually long verticils; legs brown, outer tarsal segments more yellowed; wings very pale brown, stigma slightly darker; longitudinal veins beyond cord with abundant macrotrichia; male hypopygium with outer dististyle nearly

straight, blackened, apex subtruncate; ædeagus sinuous, the tip recurved.

*Male*.—Length, including rostrum, about 6 to 6.5 millimeters; wing, 5.5 to 6; rostrum alone, 0.5 to 0.6; antenna, about 1.

*Female*.—Length, including rostrum, about 6.5 to 7 millimeters; wing, 5.5 to 6; rostrum alone, about 0.8.

Rostrum brownish black; palpi black. Antennæ black, slightly longer than the rostrum; basal flagellar segments short, transverse, crowded, the verticils very small, the outer five segments long and slender with exceedingly long verticils, some exceeding twice the segments. Head brownish black.

Thoracic dorsum almost uniformly brown, pleura slightly paler brown. Halteres brown. Legs with coxæ yellowish brown; trochanters obscure yellow; remainder of legs brown, the outer tarsal segments more yellowed. Wings (Plate 3, fig. 37) very pale brown, the stigma slightly darker; veins still darker brown. Rs and the longitudinal veins beyond cord with abundant macrotrichia, the basal veins glabrous. Venation:  $Sc_2$  ending shortly before fork of Rs, the branches of the latter diverging outwardly, cell  $R_2$  at margin about one-fourth as extensive as cell  $R_3$ ; cell 1st  $M_2$  rectangular; m-cu close to fork of M.

Abdominal tergites dark brown, sternites and hypopygium paler. Male hypopygium (Plate 5, fig. 53) with mesal face of basistyle, *b*, with strong black bristles but no distinct lobe. Outer dististyle, *d*, black, nearly straight, at apex divided into two short points, in cases subtruncate; inner style with more than the basal half dilated, the outer margin with erect black bristles, beneath with longer black setæ, outer third narrowed, gently curved. Gonapophysis, *g*, as figured. Ædeagus strongly sinuous, recurved outwardly.

*Habitat*.—India (Sikkim, West Bengal).

Holotype, male, Lingtam, Sikkim, 4,600 feet, September 2, 1959 (*Schmid*). Allotype, female, Lingsoka, West Bengal, 3,930 feet, September 7, 1959. Paratypes, 2 males, with the allotype; 1 male, Changpung, Sikkim, 4,930 feet, September 27, 1959; 1 female, Hi, Sikkim, 5,500 feet, April 3, 1959; males and females, Kechoiperi, Sikkim, 5,900 feet, April 9, 1959; males, Lingtham, Sikkim, 6,500 feet, August 8, 1959; males, Nampung, Sikkim, 3,280 feet, May 8, 1959; 1 male, Nanga, Sikkim, 5,000 feet, August 4, 1959; males, Singbeng, Sikkim, 4,920 feet, April 26, 1959; males, Singhik, Sikkim, 3,700 feet,

August 7, 1959; 1 female, Git Dabling, West Bengal, 4,900 to 5,100 feet, September 13, 1959; Lingsoka, with the allotype, 2 males, September 7, 1959 (*Schmid*).

From other small brown species that have the rostrum shorter than the antennæ, the present fly is best distinguished by the structure of the antennæ and male hypopygium, including the unusually long flagellar verticils. A somewhat similar condition of the antennæ is found in *Helius* (*Helius*) *murreensis* Alexander and a few other species.

## ILLUSTRATIONS

[Legend: a, aedeagus; b, basistyle; d, dististyle; g, gonapophysis; t, tergite.]

### PLATE 1

- FIG. 1. *Limonia* (*Limonia*) *amblymera* sp.nov.; venation.  
 2. *Limonia* (*Limonia*) *murcida* sp.nov.; venation.  
 3. *Limonia* (*Limonia*) *sannionis* sp.nov.; venation.  
 4. *Limonia* (*Dicranomyia*) *neananta* sp.nov.; venation.  
 5. *Limonia* (*Dicranomyia*) *rectistyla* sp.nov.; venation.  
 6. *Limonia* (*Dicranomyia*) *varsha* sp.nov.; venation.  
 7. *Limonia* (*Geranomyia*) *commogastra* sp.nov.; venation.  
 8. *Limonia* (*Geranomyia*) *durga* sp.nov.; venation.  
 9. *Limonia* (*Geranomyia*) *hirudinis* sp.nov.; venation.  
 10. *Limonia* (*Eurhipidia*) *hexadyclona* sp.nov.; venation.  
 11. *Limonia* (*Melanolimonia*) *eveza* sp.nov.; venation.  
 12. *Limonia* (*Thrypticomys*) *estigmata* sp.nov.; venation.  
 13. *Limonia* *congesta* sp.nov.; venation.  
 14. *Limonia* (*Limonia*) *amblymera* sp.nov.; male hypopygium.  
 15. *Limonia* (*Limonia*) *murcida* sp.nov.; male hypopygium.  
 16. *Limonia* (*Limonia*) *sannionis* sp.nov.; male hypopygium.

### PLATE 2

- FIG. 17. *Limonia* (*Dicranomyia*) *neananta* sp.nov.; male hypopygium.  
 18. *Limonia* (*Dicranomyia*) *rectistyla* sp.nov.; male hypopygium.  
 19. *Limonia* (*Dicranomyia*) *varsha* sp.nov.; male hypopygium.  
 20. *Limonia* (*Geranomyia*) *durga* sp.nov.; male hypopygium.  
 21. *Limonia* (*Geranomyia*) *commogastra* sp.nov.; male hypopygium.  
 22. *Limonia* (*Geranomyia*) *hirudinis* sp.nov.; male hypopygium.  
 23. *Limonia* (*Eurhipidia*) *hexadyclona* sp.nov.; male hypopygium.  
 24. *Limonia* (*Eurhipidia*) *hexadyclona* sp.nov.; male antenna.  
 25. *Limonia* (*Melanolimonia*) *eveza* sp.nov.; male hypopygium.

### PLATE 3

- FIG. 26. *Helius* (*Helius*) *anamalaiensis* sp.nov.; venation.  
 27. *Helius* (*Helius*) *apophysalis* sp.nov.; venation.  
 28. *Helius* (*Helius*) *catreus* sp.nov.; venation.  
 29. *Helius* (*Helius*) *compactus* sp.nov.; venation.  
 30. *Helius* (*Helius*) *fuscoangustus* sp.nov.; venation.  
 31. *Helius* (*Helius*) *impensus* sp.nov.; venation.  
 32. *Helius* (*Helius*) *numenius* sp.nov.; venation.  
 33. *Helius* (*Helius*) *oxystylus* sp.nov.; venation.  
 34. *Helius* (*Helius*) *serenus* sp.nov.; venation.  
 35. *Helius* (*Helius*) *tantalus* sp.nov.; venation.  
 36. *Helius* (*Helius*) *taos* sp.nov.; venation.  
 37. *Helius* (*Helius*) *verticillatus* sp.nov.; venation.  
 38. *Helius* (*Helius*) *compactus* sp.nov.; male antenna.

39. *Helius* (*Helius*) *impensus* sp.nov.; female antenna.  
40. *Helius* (*Helius*) *murrensis* Alexander; female antenna.  
41. *Helius* (*Helius*) *oxystylus* sp.nov.; male antenna.

## PLATE 4

- FIG. 42. *Helius* (*Helius*) *anamalaiensis* sp.nov.; male hypopygium.  
43. *Helius* (*Helius*) *apophysalis* sp.nov.; male hypopygium.  
44. *Helius* (*Helius*) *catreus* sp.nov.; male hypopygium.  
45. *Helius* (*Helius*) *compactus* sp.nov.; male hypopygium.  
46. *Helius* (*Helius*) *fratellus* (Brunetti); male hypopygium.  
47. *Helius* (*Helius*) *fuscoangustus* sp.nov.; male hypopygium.

## PLATE 5

- FIG. 48. *Helius* (*Helius*) *impensus* sp.nov.; male hypopygium.  
49. *Helius* (*Helius*) *numenius* sp.nov.; male hypopygium.  
50. *Helius* (*Helius*) *oxystylus* sp.nov.; male hypopygium.  
51. *Helius* (*Helius*) *tantalus* sp.nov.; male hypopygium.  
52. *Helius* (*Helius*) *serenus* sp.nov.; male hypopygium.  
53. *Helius* (*Helius*) *verticillatus* sp.nov.; male hypopygium.  
54. *Helius* (*Helius*) *taos* sp.nov.; male hypopygium.